Plastic Removal During Waste Water Treatment

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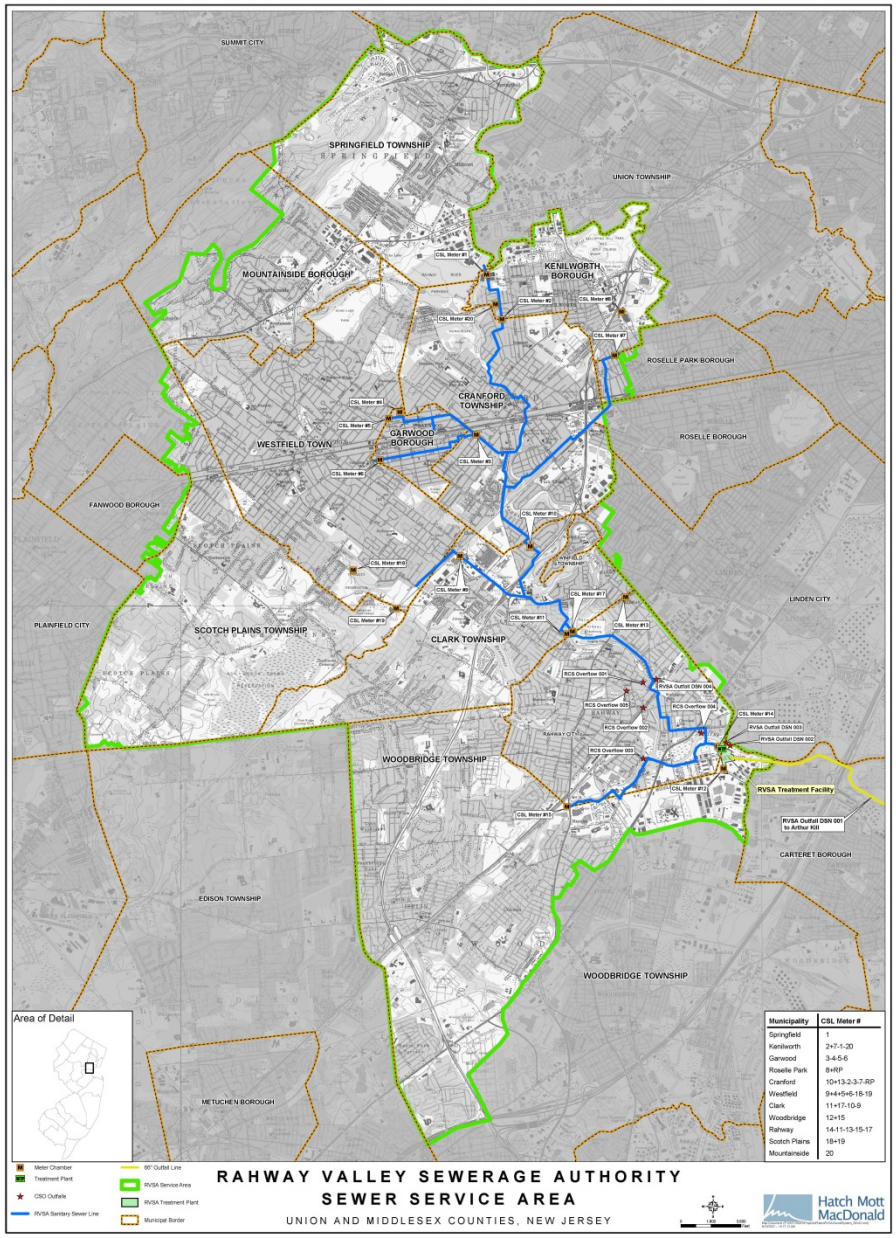
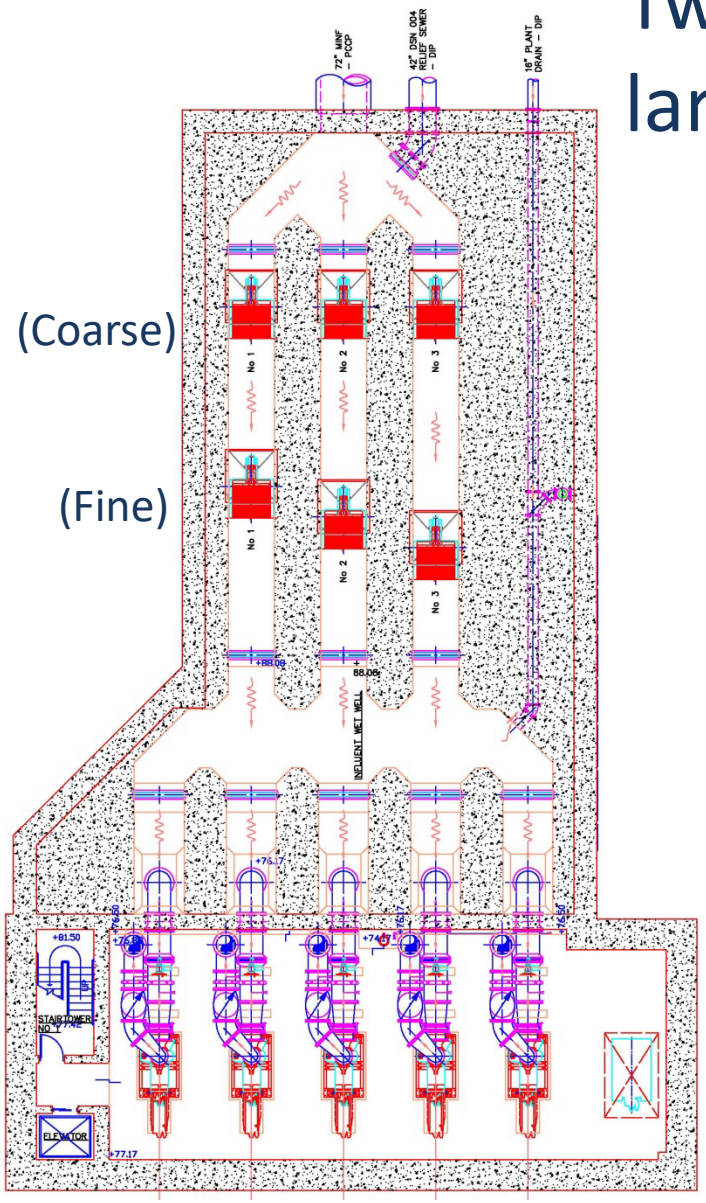
Introduction to the RVSA



- Established in 1935, secondary came online in the 70s and expansion and tertiary completed in 2010
- 11 member and 4 customer municipalities
- More than 250,000 residents and 3,500 industrial and commercial customers
- Average daily flow of 25-30 MGD and a peak design capacity of 105 MGD

Preliminary Treatment



(Coarse)

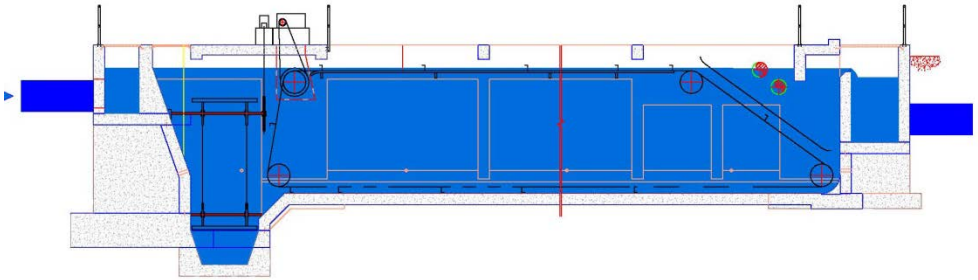
(Fine)

Two sets of bar screens remove larger debris from the waste stream

- Coarse Screens have a 3 inch spacing
- Fine Screens have a 3/8 inch spacing

Primary Treatment

The flow is further slowed down in our Primary Settling Tanks. The light floatable material, including plastics such as wrappers and straws, are collected.

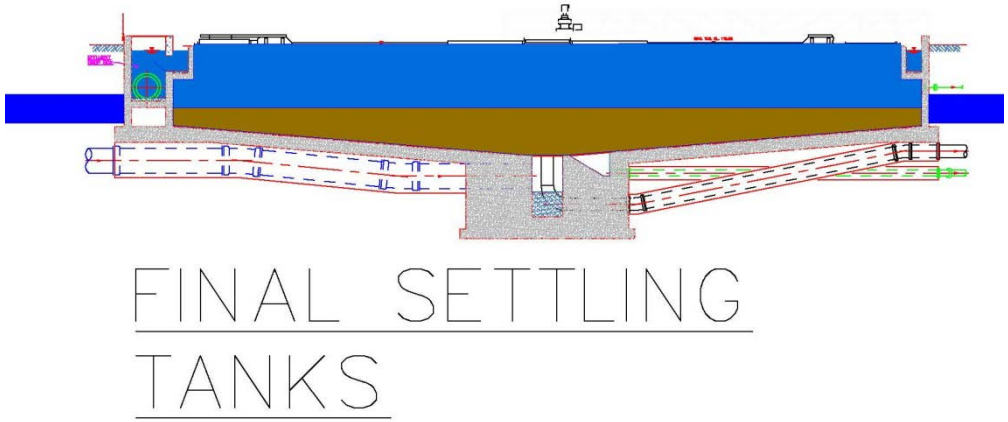


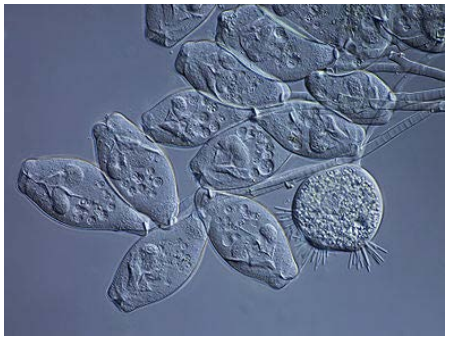
PRIMARY
SETTLING TANKS

Secondary Treatment

During the activated sludge process, micro organisms consume the non-settleable colloidal solids. The resulting biomass is then allowed to settle in the final clarifiers.

As the biomass settles, it acts as a sieve to capture any non-consumed non-settleable solids. It is likely that microplastics would also captured in this “sludge”





Tertiary Treatment

In the last step before disinfection, the FST effluent flows through a sand filter to capture any solids that did not settle in the previous step.

- Filter bed consists of 11 inches of sand over porous plate supports
- Sand size specification: 0.55 – 0.65 mm (AWWA Designation B100)
- Peak design flow of 55 MGD
- Effluent TSS Concentration of 5 – 10 mg/L

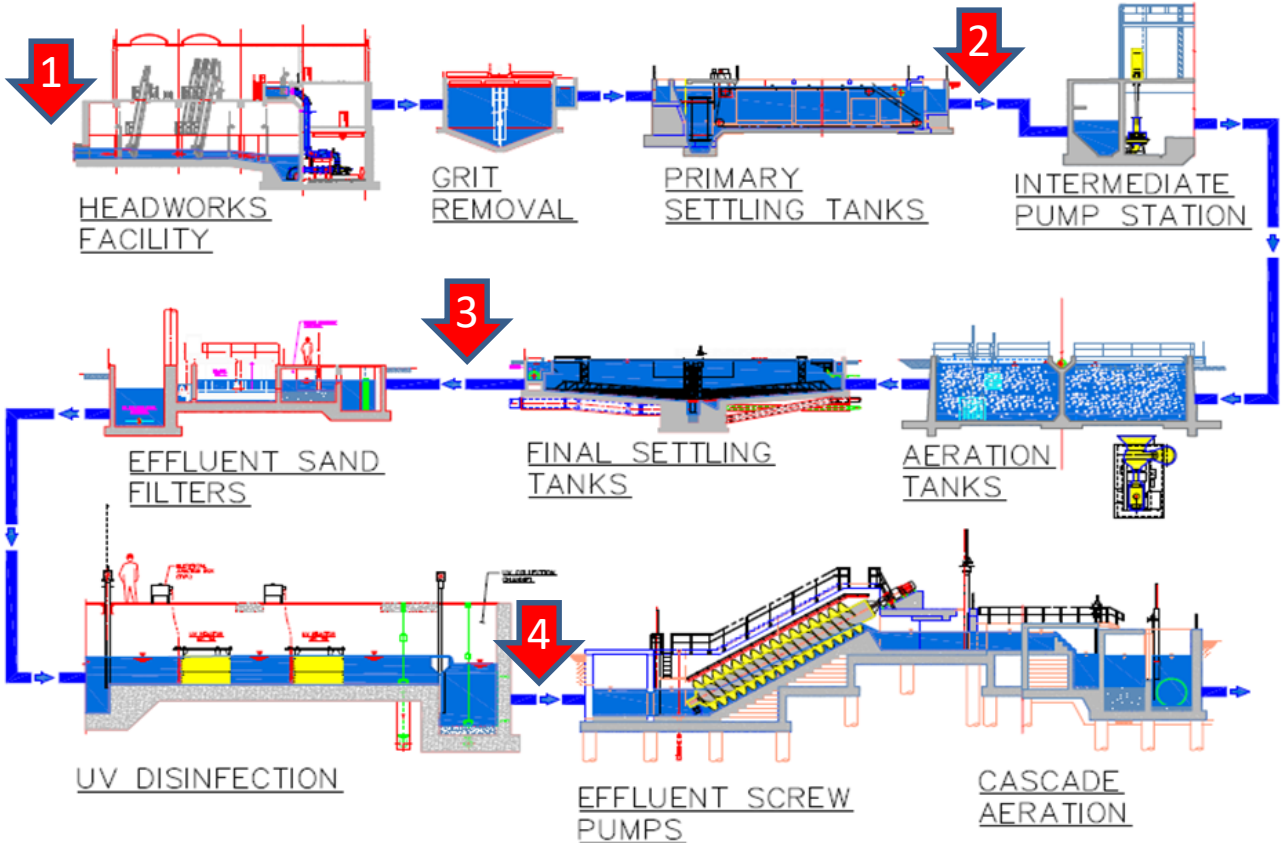
Microplastic Testing

RVSA collaborated with Dr. Nicole Fahrenfeld of Rutgers School of Engineering to sample for microplastic contaminants at various points in our treatment process.

Composite samples were taken over a 24 hour period starting on March 13th by RVSA and sent to Rutgers for testing

Microplastic Testing

Four locations were samples at various points in the treatment:



1. Raw Influent
2. Primary Effluent
3. Secondary Effluent
4. Final Effluent

Moving Forward

Microplastic Testing in Biosolids

The RVSA produces 2,600 dry tons of biosolids annually which are processed in a dryer which heats the sludge to 270°F to produce a 95% solids product which is currently beneficially reused as landfill cover.

Microplastic Testing in Biosolids

The RVSA is in the process of getting our dried product certified as a “Class A” biosolids which would allow for land application and use as a fertilizer. It is possible however that the biosolids contain microplastic material.

Microplastic Testing in Biosolids

It is possible that during heating and drying process some of the plastic material is flashed off in the vapor which is collected and returned back into our treatment system.

Additional testing in the future is required to determine the levels of microplastics remaining in the final product.

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Thank you!